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Summary of: Participation in Adult Schooling and its Earnings Impact in Canada

by Xuelin Zhang and Boris Palameta

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1. Introduction

More adult Canadians are returning to school for additional education, a trend closely related to technological changes that create new jobs, destroy old ones, and render some knowledge and skills obsolete. For workers who apply for jobs requiring new knowledge and skills, as well as workers for whom job retention or promotion requires updated knowledge and skills, going back to school is an option. In this study, we look at adult schooling, or those educational activities undertaken by individuals who have left school and have been working for some time before returning. We focus on formal adult schooling in an educational institution such as community college, institute of applied arts and technology, CEGEP (in Quebec), or university. Drawing upon data from Statistics Canada's Survey of Labour and Income Dynamics (SLID), we ask who participates in adult schooling, who benefits, and by how much.

In section 2, we discuss the characteristics of the selected sample. Section 3 investigates the characteristics of adult schooling participants. Section 4 presents our empirical results on the earnings impact of adult schooling, and the summary and conclusions are in section 5.

2. Sample Characteristics

Statistics Canada's Survey of Labour and Income Dynamics (SLID), a longitudinal household survey, covers roughly 97% of the population. Our sample is drawn from two complete panels of respondents (1993 to 1998 and 1996 to 2001). Each panel comprises approximately 15,000 households and 30,000 adults. Respondents are surveyed twice a year for six consecutive years. In SLID, each respondent's level of education is established during the first interview. Subsequent educational activity is reported yearly, including school attendance and post-secondary certificates received. Thus, year 1 to year 6 changes in wages and earnings can be compared between those who did not attend school in the 6-year period and those who attended at some point between years 2 and 5. Schooling participants can be further classified between those who received a post-secondary certificate and those who did not.[1]

We select workers who responded to the surveys in each year (95% of respondents). To eliminate those who had not yet entered the labour market and those who were approaching retirement, we include only persons between the ages of 17 and 59 in the first year of observation. We exclude those aged between 50 and 59 in the first year who received pension benefits at any time during the 6-year period. We exclude students in the first and last years of observation. Since we do not know if an individual who attended school in the first year was a continuing student, excluding those attending school in the first year ensures that we are dealing with workers who returned to school, not continuing students. For students in the 6th year, some might have no earnings data, and others might work less than a year; hence a comparison of annual earnings in years 1 and 6 would not be meaningful.

1. Persons receiving a high-school diploma are included in this group: there were too few to warrant a separate group.

We only include workers who worked full-time for at least part of the year, or whose main job was either full-time or involuntary part-time.[2] Further, because we focus on the impact of adult schooling on wages and earnings from paid employment, people with any self-employment earnings are excluded. Finally, those with unknown initial level of education are excluded, leaving a sample of 10,999, 59% of which are men, and 41% women.

We use individual age in the first year of a panel to separate young (17 to 34 years) from older (35 to 59 years) workers: 42% of men and 36% of women in our sample were young workers. We also examine marital status: at the end of the first year of observation, 73% of men and 70% of women were married; 21% of men and 19% of women were single (never married). We use the level of education in the first year of observation to classify individuals into low- and high-educated workers. We define high school graduates and those with less than high school education as low-educated; those with more than a high school education are defined as high-educated. Twenty-one percent of men and 23% of women were high school graduates; 20% of men and 15% of women had less than high school education. Among the remaining workers, 15% of men and 14% of women had a bachelor or higher degree; 45% of men and 48% of women had an education above high school but below the bachelor level.

3. Participation in Adult Schooling

In our sample, 14% of men and 15% of women participated in adult schooling, and more than half of them (roughly 8%) obtained a post-secondary certificate.

We found that age affects adult schooling participation: young workers were more likely to participate and more likely to obtain a post-secondary certificate than older workers. Initial level of education is another factor: workers with less than a high school education were least likely to participate in adult schooling and to obtain a post-secondary certificate; workers with a college-level education were most likely to participate and to obtain a certificate.

Single (never married) workers were most likely to participate in adult schooling. They were also most likely to obtain a post-secondary certificate, particularly among women: close to 12% of single women obtained a post-secondary certificate, while less than 5% of divorced women did so. The effect of marital status was not as strong for men as for women.

Whether they obtained a post-secondary certificate or not, adult students most frequently attended non-university post-secondary institutions, such as community colleges, institutes of applied arts and technology, and trade or vocational schools: 59% of adult students who did not obtain a certificate attended at least one of these institutions. Among those who did obtain a certificate, more than 88% did so at a non-university post-secondary institution.

Turning to multivariate analyses, separating those who obtain a post-secondary certificate or diploma from those who do not results in a dependent variable with three possibilities: not participating,

2. The main job is considered to be involuntary part-time if the reason given for being part-time is "could only find part-time work."

participating but no certificate received, or participating with a certificate received. We calculate the predicted probabilities of each, using both logit and multinomial logit models.

Since participation in adult schooling is closely related to labour supply decisions, and the labour supply decisions of men and women are affected by different factors, we exam adult schooling participation of men and women separately. Explanatory variables include hourly wage rate, family income, marital status, and the presence of young children. Since older workers have fewer years to recover schooling costs, we include age (young/old) as a key explanatory variable. Other variables included are initial level of education, parents' education, union status, industry, occupation, firm size, and full- and part-time employment.

Results from the multivariate models indicate that young workers were more likely than older workers to participate in adult schooling, and they were more likely to obtain a post-secondary certificate. Workers with less than high school education were least likely to participate in adult schooling and were also least likely to obtain a post-secondary certificate, a finding consistent with the "learning begets more learning" hypothesis. But it does not imply a simple monotonic relation between adult schooling and the initial level of education. The probabilities of obtaining a post-secondary certificate for high school, college, and university graduates were practically the same.

Marital status played an important role among women. Single women were twice as likely as divorced women to obtain a post-secondary certificate. While the presence of young children (less than 6 years old) did not affect men's participation in adult schooling, it mattered for women. The predicted probability of obtaining a post-secondary certificate for women was lowered by two percentage points by the presence of young children, and this decrease was statistically significant.

When workers receive high wages, their opportunity cost of attending school is also high, and we would expect a negative relationship between wage rate and participation in adult schooling. In the logit model, the effect of hourly wage on participation in adult schooling was negative for both men and women, although the estimates were not statistically significant. The estimates were less clear in the multinomial logit model, except for men who participated in "no-certificate" adult schooling: a one dollar increase in hourly wage rate lowered the participation probability by 0.1 percentage point.

Men's participation in adult education and their receipt of a post-secondary certificate were negatively related to family income, but these relationships were not statistically significant. For women, the logit model indicates that women whose family income was in the lowest quartile were more likely to participate in adult schooling than those in the highest quartile, but this relationship does not hold strongly in the multinomial logit model.

Male workers with a part-time job were more likely than full-time counterparts to participate in adult schooling. However, the participation difference between part- and full-time men was largely confined to the "no-certificate" case. Men who worked for larger firms were more likely to participate in adult schooling than men who worked for the smallest firms, but firm size effect was confined to the "no-certificate" case.

Participation probabilities of men working in professional services, transportation, and warehousing industries were significantly lower than men in manufacturing. The participation probabilities for women in financial services, and to a lesser extent in retail trades and primary industries, were higher than women in manufacturing. Men in information services, transportation, and warehousing industries were also less likely to obtain a post-secondary certificate, while men in public services were more likely to obtain a post-secondary certificate. The effect of industry on post-secondary certificate was not significant for women.

4. The Earnings Impact of Adult Schooling

Earnings growth over the six-year period of observation is assessed in terms of hourly wage rate and annual earnings. Comparing average earnings in the first and last years, it is apparent that those who went back to school had greater gains than those who did not: the annual earnings of men who participated in adult schooling grew by 24%; the annual earnings of those who did not, grew by only 15%. However, if participants in adult education are divided into those who did (CERT) and those who did not (NOCERT) obtain a post-secondary certificate, those who obtained a certificate had the largest earnings gains, particularly among women. Wage rates and annual earnings of women who obtained a certificate grew at almost double the rate of women who did not participate. But women who went back to school without obtaining a certificate had a slower earnings growth than women who did not participate.

To isolate the association between earnings gains and adult schooling, we estimate a regression model in which other variables associated with earnings gains are controlled. For the CERT group, the returns are positive in terms of annual earnings and hourly wage, though only the latter is significant at the 5% level. However, for the NOCERT group, the estimate for hourly wage was negative and not significant, while the estimated annual earnings change was at -14% and just failed to reach significance at the 5% level. Approximately 20% of the NOCERT group went no higher than high school when going back to school. While only about 10% of adult students who obtained a post-secondary certificate did so at the university level, there were significant hourly wage returns to both non-university and university level certificates (5% and 8%, respectively). Although returns to a university level certificate were higher, the difference is not statistically significant.

Most men and some women who obtained a post-secondary certificate had sizable wage and earnings gains. Overall, the estimated wage and annual earnings returns to men who obtained a certificate were 8% and 7% respectively. All groups of men who obtained a certificate had a significantly higher growth in their hourly wages than those who did not participate in adult schooling; the returns ranged from 6% for men whose initial level of education was college or higher, to 10% for men with high school or less education. In addition, most groups (with the exception of those aged 35 to 59) received substantial returns to their annual earnings, though the results for high- and low-educated men were only significant at the 10% level. Compared with men, where all groups benefited from obtaining a certificate, benefits to women seem limited. Only women aged 17 to 34 had high returns in both hourly wage and annual earnings (11% and 15%, respectively) upon obtaining a certificate. In addition, low-educated women who obtained a certificate received significant returns in hourly wage, but not in annual earnings.

Further investigations show that those who return to school and obtain a post-secondary certificate appear to gain in wage and earnings through two different channels: they progress within their firm, getting a promotion or a raise (job-stayers), or they get a better-paying job elsewhere (job-switchers). Overall, both men and women who obtained a post-secondary certificate while staying with the same employer saw significant wage and earnings gains: 10% and 9% respectively for men, and 6% and 9% respectively for women. Returns were substantial for job-staying men of all ages and education levels; for women, the gains were confined to women aged 35 to 59, and women whose initial level of education was college or higher. Women aged 35 to 59 had substantial gains in both hourly wages and annual earnings, though only the latter was significant at the 5% level. High-educated women who obtained a post-secondary certificate while staying on the same job registered a significant gain in annual earnings but not in hourly wage rate, implying that gains result from an increase in hours worked, rather than an increase in wage rate.

For job-switchers, obtaining a post-secondary certificate only resulted in significant wage returns for young men and women. In fact, older certificate-obtaining women who switched jobs registered some wage loss compared to their counterparts who did not participate in adult schooling. Older job-switchers who go back to school without obtaining a certificate may also register substantial losses, in both hourly wage and annual earnings for men, and annual earnings for women, at least in the short-term. Finally, low-educated women who switch jobs while obtaining a post-secondary certificate may receive a wage return, though the estimate is only significant at the 10% level.

5. Summary and Conclusions

After examining the participation patterns and the earnings and wage impacts of adult schooling, we find that, for both men and women, the participation decision is strongly correlated with age, initial level of education, and marital status. Young and single workers (17 to 34 years old) are more likely than older (35 to 59 years old), married, and divorced workers to participate in adult education and to obtain a post-secondary certificate. Workers with less than high school education are less likely to participate than workers with high school or higher education.

For men, higher wage decreases participation probability, while working part-time or working for a large firm increases participation. For women, the presence of young children decreases their probability of obtaining a post-secondary certificate, while lower family income encourages them to participate in adult education.

All groups of men receive significant hourly wage returns from obtaining a post-secondary certificate, but these returns are largely confined to men who stay with the same employer; among job-switchers, only young men benefit from a certificate. In terms of annual earnings, all groups who stay with the same employer benefit from obtaining a certificate, but none of their job-switching counterparts do so. Among women who obtain a certificate and staying with the same employer, two groups of them benefit substantially: older workers receive both wage and earnings gains, while women whose initial level of education was college or higher receive significant earnings gains only. But among women who obtain their certificate while switching jobs, only young women (17 to 34 years old) and women whose initial level of education is high school or less receive significant wage gains.

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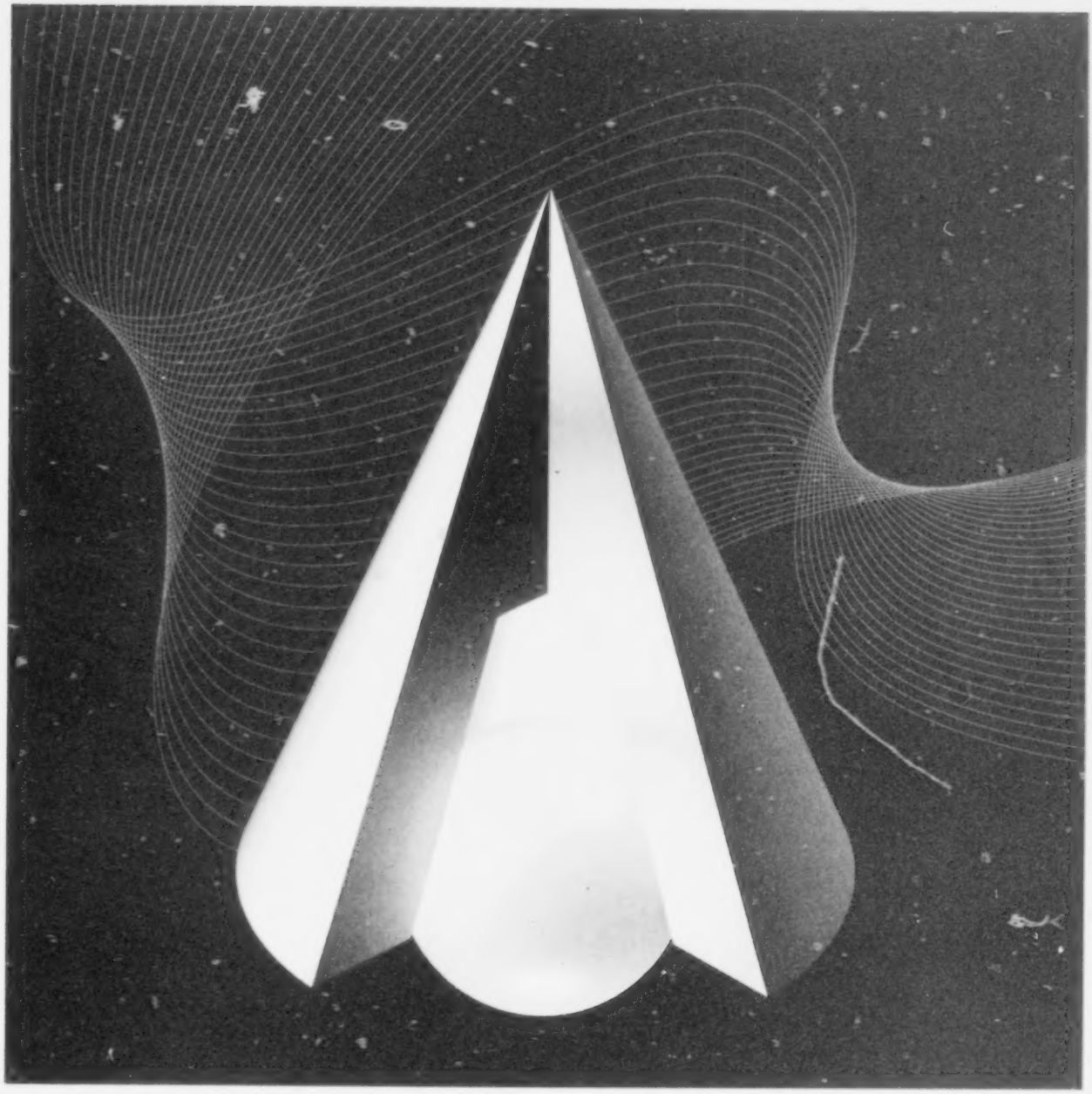

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Abstract

Based on a sample drawn from Statistics Canada's Survey of Labour and Income Dynamics (SLID: 1993 to 1998 and 1996 to 2001), the study finds that young (17 to 34 years old) and single workers were more likely than older (35 to 59 years old) and married and divorced workers to participate in adult schooling and to obtain a post-secondary certificate. Workers with less than a high school education who might have the greatest need to increase their human capital investment were less likely to participate in adult education than workers with high school or more education.

The study shows that male workers who obtained a post-secondary certificate while staying with the same employer generally registered higher wage and earnings gains than their counterparts who did not go back to school, regardless of age and initial level of education. On the other hand, men who obtained a certificate and switched jobs generally realized no significant return to their additional education, with the exception of young men (17 to 34 years old) who would receive significant returns to a certificate, whether they switched employer or stayed with the same employer.

Obtaining a certificate generated significant wage and earnings returns for older women (aged 35 to 59) who stayed with the same employer, and significant wage returns for young women who switched employers.

Keywords: adult schooling, post-secondary certificate, annual earnings, hourly wage

1. *Introduction*

In Canada and other industrialized countries, many adult workers return to school to obtain additional education. Gower (1997) reports that between 1976 and 1996, the number of Canadians aged 25 to 64 attending school full-time had more than tripled. Statistics Canada's Adult Education and Training Surveys (AETS) show that more than 27% of individuals 17 years or older who were not full-time students participated in a program or course of adult education or training in recent years,[1] while in the mid-1980s, the proportion of adults involved in organized learning was only around 20%.[2] Similar trends are reported in other countries. For example, in the United States, while less than 10% of registered students were 35 years or older in 1970, this increased to more than 19% in 2001.[3]

Among other things, the increase in adult education and training is closely related to technological progress. Technological changes create new jobs and destroy old ones, and the adoption of new technologies can render the knowledge and skills of some workers obsolete. For workers who attempt to change their careers and apply for jobs that require new knowledge and skills, as well as workers for whom job retention or promotion requires them to update their knowledge and skills, going back to school seems to be a sensible choice.

Another group of workers who return to school are those who did not make sufficient human capital investments while they were young, perhaps due to external shocks such as early marriage, child bearing and rearing, financial troubles caused by parents' job loss or separation, or attractive labour market conditions. A tight labour market can drive some students, particularly those who have difficulties in school, into the labour force prematurely. With insufficient human capital investment, these individuals have entered the labour market as low-educated or low-skilled workers, and some of them may want to increase their human capital investment at an older age.

By adult schooling, we mean educational activities undertaken by individuals who had stopped attending school and had been working for some time before returning to school. We focus on formal adult schooling in which participants enrol in an educational institution such as community college, institute of applied arts and technology, CEGEP (in the province of Quebec) and university. We do not consider informal learning such as self-study in which students do not have to attend an educational institution.

Adult schooling is clearly different from regular schooling. Adult students may work full-time,[4] part-time or not work at all when they attend school, while regular students normally go to school on a full-time basis. In addition, participants in adult schooling are typically older and more experienced than regular students. Hence the opportunity cost (or forgone earnings) of schooling for adult students is usually higher than that for regular students.

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1. Statistics Canada (2004).

2. Field (2000).

3. "Classrooms filled with returning adults," USA Today, June 12, 2003.

4. Full-time workers can attend school during the evening or weekend.

Although adult schooling shares some features of job training, there are also important differences. Among other things, training is closely related to the requirements of a particular job that the participant either holds currently or will hold in the near future. The skills acquired by trainees are likely to be job specific, and the training costs are often shared between the employer and the participant. On the other hand, participants in adult schooling typically acquire general knowledge and skills, and as a result, the direct costs of adult schooling are more likely to be borne by the participants themselves.

While economists have made enormous efforts to investigate the labour market effects of education and training in general, few of these studies have focused on the effects of adult schooling, particularly in Canada. This is an important knowledge gap we attempt to fill.[5] We ask the following questions: Who participates in adult schooling? Does adult schooling benefit participants? Who benefits from adult schooling and by how much, and who does not? We employ two panels of Statistics Canada's Survey of Labour and Income Dynamics (1993 to 1998 and 1996 to 2001) to shed light on these questions.

The next section briefly reviews the literature. Section 3 discusses the characteristics of the sample we selected. In Section 4, we investigate the characteristics of participants in adult schooling while in Section 5 we present our empirical results on the earnings impact of adult schooling. Finally, the summary and conclusions are contained in Section 6.

2. *A brief review of the literature*

The participation trend in adult schooling is well documented in Canada. Haggar-Guénette (1991) characterizes adults who go back to school from a lifelong learning perspective. She finds that the trend in lifelong learning is more apparent among women than men. The trend is also evident among younger adults and adults who are already well educated. The majority of them are employed and work in white-collar occupations. Gower (1997) examines the factors that may affect the adult schooling decision. He finds that most participants are motivated by a desire to improve job prospects. Adults who go back to school are largely already in favourable economic circumstances, and many people who appear to have the greatest need to improve their economic prospects are not participating in adult education. Tuijnman and Boudard (2001) find similar evidences for Canada in the North American context.

A few authors have examined the earnings impacts of adult education. Light (1995), following earlier work by Griliches (1980) and Marcus (1984), investigates the returns to adult schooling. Using a sample of young men aged between 16 and 32 from the 1979 to 1989 National Longitudinal Surveys of Youth (NLSY), she finds the returns to adult schooling are equal to those of regular schooling for well-educated workers. For example, individuals with 12 or more years of education who return to school at an older age receive wage boosts that are smaller than those received by their continuously schooled counterparts, but wage growth accelerates during the years following the reenrolment, and, 6 years later, the wage gap disappears between those who delay their schooling and those who obtain the same amount of education continuously. Among individuals with fewer than 12 years of school, there is little difference between the wages of those who receive their schooling continuously and those who receive their schooling discontinuously.

5. Baran et al. (2000) discuss some key knowledge gaps for adult education and training in Canada.

Leigh and Gill (1997) focus on the labour market returns to community college for returning men and women (28 to 35 years old) with a sample drawn from the 1993 NLSY. Their results indicate that the returns are strongly positive and essentially the same size as those of continuing high school graduates. Furthermore, returning adult men in non-degree programs receive 8% to 10% higher earnings than continuing students.

Jacobson, LaLonde and Sullivan (2003) estimate the earnings impact of community college on displaced workers (35 years or older) who lived in Washington State. They find the per-period impact for older and younger displaced workers is similar: one academic year of community college increases earnings by about 8% for older males and around 10% for older females.

However, studies from some European countries find that adult schooling has little impact on earnings. Egerton (2000), using data from Britain's General Household Surveys (1983 to 1992), compares the weekly earnings differentials between men who obtained a degree at an older age and men who obtained a degree at usual age. The results show that older graduates earned less than their younger counterparts over most of their graduate careers. A recent study by Jenkins et al. (2002) indicates that the acquisition of formal qualifications later in life (from the age of 33 to 42) has no measurable impact on individuals' wages in the United Kingdom. Similarly, studies by Ekström (2003) and Albrecht et al. (2004) show that adult schooling has no positive income effect for either sex in Sweden.

In Canada, studies on the returns to education are abundant,[6] but to the authors' best knowledge, no previous research attempts to separate the impacts of adult schooling from those of regular schooling. Investigations of adult learning focus almost exclusively on workplace training, government supported training and adult literacy. Statistics Canada's Adult Education and Training Surveys (AETS) generate a number of studies on adult education and training in Canada.[7] However, as a cross-sectional survey and as a survey designed primarily to measure the incidence and variation in types of adult education and training, the AETS is not well suited for examining the earnings impacts of adult schooling.

3. *Sample characteristics*

This study employs Statistics Canada's Survey of Labour and Income Dynamics (SLID). The SLID is a longitudinal household survey that covers roughly 97% of the Canadian population, excluding those who live in the Territories, in institutions, on Indian reserves or in military barracks. Each panel of respondents, comprising approximately 15,000 households and 30,000 adults, is surveyed twice a year—once on labour market experiences, educational activity and family relationships and once on income[8]—for a period of 6 consecutive years. A new six-year panel is introduced every three years, so two panels always overlap. Presently, longitudinal data are available from two complete panels (1993 to 1998 and 1996 to 2001) from which our sample is drawn.

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6. For a review, see Cohn and Addison (1998).

7. For an example, see Hui and Smith (2003).

8. As of 2004, the labour and income interviews are combined, so that each respondent is surveyed once a year.

In SLID, each respondent's level of education is established during the first interview, including information on all post-secondary certificates the respondent has obtained. Subsequent educational activity is reported each year, including school attendance[9] and new post-secondary certificates received. Therefore, year 1 to year 6 changes in wages and earnings can be compared between those who did not attend school in the 6-year period and those who attended at some point between years 2 and 5 but did not receive a new post-secondary certificate,[10] and those who received a new certificate.

To assess the earnings impact of adult education, we selected a sample according to the following criteria. First, only workers who responded for all six years (roughly 95% of all respondents) are included. Second, in order to eliminate those who have not yet entered the labour market and those who are nearing retirement, we include only persons between the ages of 17 and 59 in the first year of observation. In addition, those between the ages of 50 and 59 in the first year who received pension benefits at any time during the 6-year period are also excluded. The rationale behind these exclusions is that people in their fifties who are receiving pension benefits are likely to be those who are taking an early retirement. The educational activities of those retirees or those soon-to-be retirees are unlikely to have any effects on their labour market prospects.

Third, we exclude those who were full-time or part-time students or who received a post-secondary certificate in the first or last years of observation. Since we do not know if an individual who attended school in the first year was a continuing student or not, excluding those who attended school in the first year ensures that we are dealing with workers who returned to school, not continuing students. For those who were students during the 6th year, some of them might have no earnings data, others might work less than a year, and hence a comparison of annual earnings in years 1 and 6 would not be meaningful for them. Fourth, since the decision to work part-time is likely to influence earnings, we only include workers who "wanted to" work full-time in years 1 and 6—that is, those who worked full-time for at least part of the year, or those whose main job was either full-time or involuntary part-time.[11] Voluntary part-time workers may turn down a better paying full-time job because they prefer to work part-time, and thus may have a very different age-earnings profile from full-time workers. We exclude them from the analysis.

In addition, because our focus is on the impact of adult schooling on workers' income from paid employment, people who had any self-employment earnings in any year of observation are excluded. Finally, those with an unknown initial level of education are also excluded, leaving a final sample of 10,999 individuals—5,326 from panel 1 and 5,673 from panel 2. The sample consists of

9. Only those who are enrolled in a credit program are considered to be attending school. Information on job-related training courses is only available for years after 2001, so in our sample such courses would only be defined as school attendance if they were part of a credit program.

10. Persons who received a high-school diploma are included in this group, as there were too few of them to warrant putting them in a separate group.

11. If a person has more than one job, the main job is defined as the one with the highest number of scheduled hours in the year. The main job is considered to be involuntary part-time if the reason given for being part-time is "could only find part-time work".

59% men and 41% women. Descriptive statistics for men and women are presented in Table A1. Here we summarize the demographic and some job characteristics of the sample. Further discussions on adult schooling participation, hourly wage rate and annual earnings will be provided in Sections 4 and 5.

We use individual age in the first year of a panel to separate young (17 to 34 years old) from older (35 to 59 years old) workers. Forty-two percent of men and 36% of women in our sample fell into the young worker group. At the end of the first year of observation, 73% of men and 70% of women were married, while 21% of men and 19% of women were single (never married). We also notice that more women than men were divorced (11% vs. 6%) in the sample.

We use the level of education in the first year of observation to classify individuals into low- and high-educated workers. Twenty-one percent of men and 23% of women were high school graduates, while 20% of men and 15% of women had less than high school education. We define high school graduates and those with less than high school education as low-educated workers. The rest had above high school level education. Among them, 15% of men and 14% of women had a bachelor or higher degree while 45% of men and 48% of women had an education above high school but below the bachelor level. We define these workers with more than a high school education as high-educated workers.

The vast majority of workers, 98% of men and 89% of women, held a full-time job when they were first observed. Forty-three percent of men and 36% of women were union members or covered by a collective bargaining agreement. Around 46% of men and 43% of women worked for large firms (500 or more employees), while 19% of men and 22% of women worked for small firms (1 to 19 employees). We divided workers into 10 occupations and 16 industries. Occupations in sales and services, trades and transportation, and occupations unique in manufacturing accounted for 58% of male workers; while female workers concentrated in the administrative (36%) and sales and services (23%) occupations. Twenty-five percent of men worked in manufacturing industries while 17% of women worked in educational services, and 14% of men and women worked in wholesale and retail trade industries.

4. *Participation in adult schooling*

Of the 10,999 individuals in our sample, 1,462 attended school between years 2 and 5.[12] Among those who attended school, 929 obtained a post-secondary certificate between years 2 and 5, while 533 attended school without obtaining a certificate. Fourteen percent of men and 15% of women participated in adult schooling (Table 1). A little over 5% of men and close to 7% of women participated without obtaining a post-secondary certificate, while roughly 8% of men and women did obtain one.

We further examined a few individual characteristics that may be correlated with adult schooling participation. The results are presented in Table 1 below. Age appears to be an important factor that affects adult schooling participation. Young workers (17 to 34 years old) were more likely to participate and they were also more likely to obtain a post-secondary certificate than older workers

12. This includes both full- and part-time adult students.

(35 to 59 years old). The differences can be quite large; for example, young men were almost twice as likely as older men to participate in adult schooling and to obtain a post-secondary certificate.

Table 1 Adult schooling participation and some demographic characteristics

	Participation rate	No certificate	Certificate
Men	13.7%	5.3%	8.4%
17-34 years old	19.1%	7.8%	11.3%
35-59 years old	9.9%	3.5%	6.4%
Less than high school	8.2%	4.6%	3.6%
High school graduate	13.3%	4.5%	8.9%
College	16.3%	5.9%	10.4%
Bachelor or above	14.0%	5.6%	8.4%
Married	12.2%	4.2%	8.0%
Divorced	10.3%	2.5%	7.8%
Single (never married)	19.9%	10.0%	10.0%
Women	14.7%	6.8%	7.9%
17-34 years old	19.4%	9.0%	10.4%
35-59 years old	12.0%	5.6%	6.4%
Less than high school	10.3%	6.3%	4.0%
High school graduate	12.6%	4.9%	7.7%
College	16.9%	7.3%	9.7%
Bachelor or above	15.8%	9.8%	6.0%
Married	12.1%	4.7%	7.4%
Divorced	12.4%	7.8%	4.6%
Single (never married)	26.0%	14.4%	11.6%

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Initial level of education is another factor that plays an important role. Workers with less than high school education were least likely to participate in adult schooling and to obtain a post-secondary certificate; while workers with a college level education were most likely to participate and to obtain a post-secondary certificate. It seems that initial level of education has a particularly strong effect on certification. For example, workers with college level education were more than twice as likely as workers with less than high school education to obtain a post-secondary certificate.

With respect to marital status, single (never married) workers were most likely to participate in adult schooling. They were also most likely to obtain a post-secondary certificate, particularly among women: close to 12% of single women obtained a post-secondary certificate, while less than 5% of divorced women did so. But for men, the effect of marital status on certification was not as strong as it was for women.

Table 2 provides information on types of educational institutions attended by adult schooling participants. Workers pursuing adult education, whether they obtained a post-secondary certificate or not, most frequently attended non-university post-secondary institutions, such as community colleges, institutes of applied arts and technology, and trade or vocational schools. The table shows that 59% of adult students who did not obtain a certificate attended at least one of these educational institutions. Among those who did obtain a post-secondary certificate, more than 88% of them obtained it at a non-university post-secondary institution.

Table 2 Types of school attended by adult students

	No certificate	Post-secondary certificate[13]
High school	19.4%	...
Non-university post-secondary institutions	58.5%	88.3%
Community college/applied arts & technology	27.9%	36.5%
Trade or vocational school	13.1%	31.0%
Business or commercial school	5.7%	16.7%
CEGEP	4.8%	4.1%
Multiple types	7.0%	
University	22.2%	11.7%

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

In order to examine the adult schooling participation decision more precisely, we turn to multivariate analyses. Light (1995) points out that there are a number of theoretical explanations as to why adults go back to school. These include workers' inability to transfer skills between different jobs, the relative prices of leisure and schooling, individual abilities, and the arrival of new information on labour market opportunities. These explanations indicate that adult schooling participation decisions are closely related to labour supply decisions, job turnover, earnings opportunities and expectations, costs and financing of adult schooling.

We use the above theoretical considerations as a guideline to our empirical specification. The dependent variable, adult schooling participation, can be a binary variable for which a logit or probit model seems in order. But as the certificate or diploma obtained by a worker may provide a signal to the employer (potential or current), and since obtaining a post-secondary certificate is usually more time consuming and more costly than simply taking some courses, it is also desirable to separate those who obtain a post-secondary certificate or diploma from those who do not. This would result in a dependent variable with three possibilities: not participating, participating but no certificate is received, and participating with a certificate received, for which a multinomial logit model is appropriate. We estimate both the simple and the multinomial logit models.

Since labour supply decisions of men and women may well be affected by different factors, we estimate the models for men and women separately. Variables that affect labour supply and hence adult schooling include hourly wage rate, family income, marital status and the presence of young

13. For adult workers who obtained more than one post-secondary certificates, we only count their most recent certificate.

children. Since older workers have fewer years than their young counterparts to recover the costs of adult schooling, we include age (young/old) as a key explanatory variable.

In the adult education and training literature, it is well known that initial level of education plays a positive role in further education investment.[14] We use a few dummy variables on initial education level to test the "learning begets more learning" hypothesis. We also include marital status, parents' education, union status, industry, occupation, firm size, full- and part-time employment, urban/rural residency and provinces to capture the effects of job turnover, earnings opportunities, direct costs and financing considerations.

A number of specifications of the logit and multinomial logit models[15] have been estimated. The estimates remain relatively stable. We present the results of the most general model.[16] The results, reported as marginal effects together with the corresponding z-values, are contained in Table A2. For a group of selected characteristics, we also calculated the predicted probabilities of participation, participation without receiving a certificate and participation with a post-secondary certificate received. The calculation is based on the multinomial logit estimates. Each predicted probability is calculated conditional on a particular value of a characteristic while holding other characteristics at their means. These are presented in Table 3 below.

The results show that, other things being equal, young workers were more likely than older workers to participate in adult schooling. Table 3 indicates that the participation probability of young men was 0.17 while that for older men was only 0.10. The corresponding probabilities for young and older women were 0.18 and 0.13, respectively. Young workers were also more likely to obtain a post-secondary certificate than older workers: the probabilities of obtaining a post-secondary certificate for young men and women were 0.11 and 0.10, while those for older men and women were 0.07.

14. For example, see Heckman and Masterov (2004).

15. The base case for the multinomial logit model is the non-participant category of adult workers.

16. Estimates of other specifications are available from the authors upon request.

Table 3 Predicted probabilities of adult schooling: selected characteristics of workers/jobs*

	Men			Women		
	(1)	(2)	(3)	(1)	(2)	(3)
Age						
Young (17 to 34 years old)	0.17	0.06	0.11	0.18	0.08	0.10
Older (35 to 59 years old)	0.10	0.04	0.07	0.13	0.06	0.07
Initial level of education						
Less than high school	0.08	0.04	0.04	0.10	0.07	0.04
High school graduate	0.12	0.03	0.09	0.13	0.05	0.08
College	0.15	0.05	0.10	0.17	0.07	0.09
Bachelor or higher	0.13	0.05	0.08	0.16	0.09	0.08
Marital status						
Single	0.15	0.06	0.10	0.20	0.11	0.10
Divorced	0.11	0.02	0.09	0.12	0.08	0.05
Married	0.12	0.04	0.08	0.13	0.05	0.08
Presence of child(ren) < 6 years old						
No young child(ren)	0.12	0.05	0.08	0.15	0.07	0.08
With young child(ren)	0.14	0.04	0.10	0.12	0.06	0.06
Job status						
Part-time job	0.25	0.12	0.14	0.18	0.09	0.09
Full-time job	0.13	0.04	0.09	0.14	0.07	0.08
Firm size						
Small (1-19 employees)	0.12	0.03	0.09	0.15	0.07	0.09
Large (500+ employees)	0.14	0.05	0.09	0.13	0.06	0.07

* The predicated probabilities are calculated with our multinomial logit model estimates (Table A2). (1) is the predicted participation probability which is equal to 1 – Pr. (not participating); (2) is the predicted probability of participation without a certificate being received; (3) is the predicted probability of participation resulting in a post-secondary certificate.

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Secondly, we find that, other things being equal, workers with less than high school education were least likely to participate in adult schooling and were also least likely to obtain a post-secondary certificate. The estimated probability for them to receive a post-secondary certificate was only 0.04 (for both men and women), while the estimated probabilities for all other (higher) education groups ranged from 0.08 to 0.10. To a certain extent, this finding is consistent with the "learning begets more learning" hypothesis. But it does not necessarily imply that there exists a simple monotonic relation between adult schooling and the initial level of education, at least not in the relatively short time period we examined. For example, we found that the probabilities of obtaining a post-secondary certificate for high school graduates, college graduates and for those who received a bachelor degree were practically the same.

Thirdly, we found that marital status also plays an important role in adult schooling participation, particularly among female workers. Other things being equal, the estimated participation probability for single (never married) women was 0.2, while those for divorced women and married women were 0.12 and 0.13, respectively. Furthermore, single women were twice as likely as divorced women to obtain a post-secondary certificate: the predicted probability 0.1 for the former and 0.05 for the latter group of women.

The presence of young children (less than 6 years old) did not seem to affect men's participation in adult schooling. But we found some evidence that it matters for women. The predicted probability of participation for a woman with young children was lower than an otherwise identical woman, although the difference was not significant. On the other hand, the predicated probability of obtaining a post-secondary certificate for women was lowered by 2 percentage points (from 0.08 to 0.06) by the presence of young children, and the decrease was statistically significant (see Table A2).

We found that Quebec and Saskatchewan men, and Prince Edward Island, Nova Scotia and Quebec women were less likely than Ontario men and women (reference groups) to participate in adult schooling. The participation probabilities of Quebec and Saskatchewan men were 3 percentage points lower than that of Ontario men, while the participation probabilities for Prince Edward Island, Nova Scotia and Quebec women were nearly 5 percentage points lower than that of Ontario women. Quebec men and women were also less likely to obtain a post-secondary certificate than Ontario men and women. The differences were 4 and 3 percentage points, respectively. (Data not shown but available from authors.)

When workers receive high wages, their opportunity cost of attending school is also high. Hence we would expect a negative relationship between wage rate and adult schooling participation. But, high wage is often considered to be positively correlated with a worker's ability or motivation, which in turn may be positively correlated with the propensity to take additional education. In the logit model, we found that the effect of hourly wage on adult schooling participation was negative for both men and women, although the estimates were not statistically significant. The estimates were less clear cut in the multinomial logit model, except for men who participated in "no-certificate" adult schooling for whom we observed that a one dollar increase in hourly wage rate lowered the participation probability by 0.1 percentage point. One possible reason for these less clear findings is that the observed hourly wage rate is an inaccurate measure of the opportunity cost for adult education since it is observed at a point of time only and is subject to transitory shocks. (Data not shown but available from authors.)

Family income is another factor that affects adult schooling participation. The relationship between family income and adult schooling can be complex. On the one hand, higher family income diminishes the motivation for a worker to take additional education if their motivation for additional education is to enhance their earnings and family income. On the other hand, higher family income enables a worker to finance his/her adult schooling more easily and hence should increase adult schooling participation, and particularly increase the probability of obtaining a post-secondary certificate, because a program leading to a certificate typically lasts longer and costs more. We found that men's participation in adult education and their receipt of a post-secondary certificate were both negatively related to family income, although none of these negative relationships was

statistically significant. For women, the logit model appears to indicate that women whose family income was in the lowest quartile were more likely to participate in adult schooling than women whose family income was in the highest quartile (Table A2). But this relationship does not hold strongly in the multinomial logit model.

Turning now to job and employment characteristics, we found that male workers who held a part-time job were more likely than their full-time counterparts to participate in adult schooling. The estimated probability to participate in adult education for part-time men was 0.25, almost twice as high as that for full-time men (Table 3). However, the participation difference between part- and full-time men was largely confined to the "no-certificate" case. Secondly, we found that men who worked for larger firms were more likely to participate in adult schooling than men who worked for the smallest firms. But again, this firm size effect was also confined only to the "no-certificate" case.

Finally, we examine the effects of occupation and industry on adult schooling participation. Our results show that there was no significant difference in overall participation (logit model) probabilities across different occupation groups. The differences existed mainly in terms of different types of adult schooling. For example, men in educational occupations, and women in educational, arts and social science occupations were less likely to obtain a post-secondary certificate than men and women in a management occupation (reference group). (Data not shown but available from authors.)

Across industries, the participation probabilities of men who worked in professional services, transportation and warehousing industries were significantly lower than that of men who worked in manufacturing industries (reference group). The participation probabilities for women who worked in financial services, and to a less extent in retail trades and primary industries, were higher than that of women who worked in manufacturing industries. Men who worked in information services, transportation and warehousing industries were also less likely than the reference group to obtain a post-secondary certificate, while men who worked in public services were more likely to obtain a post-secondary certificate than the reference group. On the other hand, the effect of industry on post-secondary certificate was not significant for women. (Data not shown but available from authors.)

5. *The earnings impact of adult schooling*

Numerous studies have documented the earnings benefits of education. But what about the earnings impact on adult workers who go back to school? The literature does not provide a consensus view. In this section, we examine the changes in earnings associated with adult schooling. Particular attention is paid to various groups of workers such as older and low-educated workers.

5.1 Raw earnings growth

Earnings growth over the six-year period of observation is assessed both in terms of hourly wage rate and annual earnings.[17] Comparing average earnings in the first and last year, it is apparent that those who went back to school at some point in the intervening years realized greater gains than those who did not participate in adult schooling (Tables 4 and 5). For example, the annual earnings of men who participated in adult schooling grew by nearly 24%; while the annual earnings of those who did not take additional school grew by only 15%.

Table 4 Average annual earnings (2001$)

	Overall			Men			Women		
	Yr 1	Yr 6	% change	Yr 1	Yr 6	% change	Yr 1	Yr 6	% change
No adult education	34,470	39,500	14.6	38,820	44,760	15.3	28,240	31,980	13.2
Adult education at some point between years 2 and 5	31,040	37,810	21.8	35,700	44,130	23.6	24,950	29,530	18.4

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Table 5 Average hourly wage (2001$)

	Overall			Men			Women		
	Yr 1	Yr 6	% change	Yr 1	Yr 6	% change	Yr 1	Yr 6	% change
No adult education	17.91	19.92	11.2	19.33	21.76	12.6	15.88	17.29	8.9
Adult education at some point between years 2 and 5	16.75	19.60	17.0	18.38	22.07	20.1	14.61	16.37	12.0

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

However, if participants in adult education are divided into those who did and those who did not obtain a post-secondary certificate, those who obtained a certificate had the largest earnings gains, particularly among women. Wage rates and annual earnings of women who obtained a certificate grew at almost double the rate of women who did not participate in adult education. Women who went back to school without obtaining a certificate, on the other hand, had a slower earnings growth than women who did not participate (Tables 6 and 7).

17. Hourly wage pertains to the main job—that is, the one with the most scheduled hours—at the end of the reference year or at the end of the job if it ended during the reference year. Tips, bonuses, and commissions are included. For respondents who reported their wage or salary at this job as an hourly amount, the value is taken directly. For respondents who reported their wage or salary on some other basis, the amount is converted to an hourly "implicit" rate, based on number of weeks or months worked and number of hours per week usually worked. Annual earnings refer to total wages and salaries from all paid worker jobs during the reference year. See Appendix 1 for more details of the annual earnings concept.

Table 6 Average annual earnings (2001$)

	Overall			Men			Women		
	Yr 1	Yr 6	% change	Yr 1	Yr 6	% change	Yr 1	Yr 6	% change
No adult education	34,470	39,500	14.6	38,820	44,760	15.3	28,240	31,980	13.2
Adult education, did not obtain a post-secondary certificate	28,600	33,060	15.6	31,690	38,410	21.2	25,280	27,300	8.0
Adult education, obtained a post-secondary certificate	32,830	41,270	25.7	38,220	47,730	24.9	24,670	31,500	27.7

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Table 7 Average hourly wage (2001$)

	Overall			Men			Women		
	Yr 1	Yr 6	% change	Yr 1	Yr 6	% change	Yr 1	Yr 6	% change
No adult education	17.91	19.92	11.2	19.33	21.76	12.6	15.88	17.29	8.9
Adult education, did not obtain a post-secondary certificate	15.77	17.78	12.7	16.76	19.70	17.5	14.71	15.72	6.9
Adult education, obtained a post-secondary certificate	17.46	20.93	19.9	19.40	23.56	21.4	14.52	16.94	16.7

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Of course, the gains in earnings reported above may result from factors other than adult schooling. For instance, the age-earnings profile is known to be steeper for younger workers, and, as we showed in the previous section, younger workers are more likely to go back to school and obtain a certificate. Individuals who go back to school are also more likely to have a higher initial level of education. In order to isolate the association between earnings gains and obtaining a certificate after going back to school, we estimate a regression model in which other variables associated with earnings gains are controlled.

5.2 The basic model

To estimate the returns to adult schooling, we employ a specification similar to the one that is commonly used in studies of earnings growth such as Podgursky and Swaim (1987),

$$\ln(W_{6i}) = \alpha + \delta \ln(W_{1i}) + \beta_1 CERT_i + \beta_2 NOCERT_i + \theta \mathbf{X}_{1i} + \varepsilon_i$$

where W_1 and W_6 represent annual earnings or hourly wage rate in the first and last years of observation, CERT and NOCERT are dummy variables representing those who did and those who did not obtain a post-secondary certificate after returning to school, and $\boldsymbol{X}$ is a set of other variables reflecting characteristics in year 1, including age, age squared, level of education, marital status, union status, firm size, full- or part-time status, industry, occupation, province, urban/rural residency, sex and the panel indicator.

The equation can be reformulated as follows,

$$\ln(W_{6i} / W_{1i}) = \alpha + (\delta - 1) \ln(W_{1i}) + \beta_1 CERT_i + \beta_2 NOCERT_i + \theta \mathbf{X}_{1i} + \varepsilon_i$$

so that, in essence what we are estimating is the growth in earnings from year 1 to year 6, where β_1 and β_2 are approximately equal to the percentage earnings growth associated with the two categories of adult education (certificate and no certificate).[18]

One advantage offered by this specification is its simplicity. It is a simple regression model and the estimation and interpretation are straight forward. More importantly, by controlling for initial wages, it allows us, to some extent, control for unobserved individual characteristics such as motivation, ability, and firm fixed effects that may influence both participation in adult education and earnings growth.[19]

5.3 Regression estimates of earnings returns to adult education

As a first step, we run regressions of hourly wage rate and annual earnings for a pooled sample of men and women. In order to take into consideration the complex survey design of the SLID, all standard errors here (and in the following sections) were calculated with 1,000 bootstrap weights. Tables 8 and 9 contain the estimation results.

The regression results confirm that there may be significant returns for adult workers who go back to school and obtain a post-secondary certificate. The returns are positive in terms of both annual earnings and hourly wage, though only the latter is significant at the 5% level (the CERT group in Table 8).[20]

However, people who pursue adult schooling without obtaining a certificate may end up with no earnings gains. This can be seen through the estimated coefficients on NOCERT. The estimate for hourly wage is negative and not significant, while the estimated annual earnings change is -14% and just fails to reach significance at the 5% level. We noticed that in our sample, approximately 20% of the NOCERT group went no higher than high school when going back to school. When the regressions are rerun with these workers removed, the coefficient on NOCERT for the hourly wage rate becomes -0.029 with a t-value of -0.91, while the coefficient on NOCERT for annual earnings becomes -0.081 with a t-value of -1.50. Thus, those who pursue adult education at the post-secondary level do not receive significant returns unless they obtain a certificate, at least in the short-term period covered by this study.

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18. The exact percentage change in earnings is given by $e^{\beta} - 1$, but β is a good approximation when it has a relatively small value.

19. One disadvantage of this model is that it assumes the earnings (wage) growth paths of those who participate in adult schooling and those who do not are identical. This may not be the case if, for example, the earnings of a worker in the year before he/she participates in adult schooling was low due to labour market shocks—an evidence documented by a number of researchers and termed as "Ashenfelter dip" (see for example, Heckman and Smith, 1999). We will examine these and other related issues in Appendix B.

20. Because SLID did not have information on on-the-job training prior to 2002, some of the people classified as having no adult education may have actually undergone such training. Thus the returns to adult education may be higher than those estimated here.

Table 8 Wage and earnings returns to adult education[21]

	Hourly wage			Annual earnings	
	Estimate	T		Estimate	T
NOCERT	-0.041	-1.40		-0.144	-1.94*
CERT	0.053	3.29**		0.042	1.57

* significant at 10%

** significant at 5%

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Of course, it is possible that it is not the certificate, per se, that is associated with greater wage returns, but rather time spent in school. People in the CERT group may spend a longer time in school and thus accumulate more human capital, which might have translated to higher returns even if they had not obtained a certificate. On the other hand, a certificate may act as a signal to employers, simplifying credential recognition and leading to preferential hiring and promotion. Unfortunately, it is difficult to distinguish between these two explanations because detailed information on the amount of time spent in school is not available from the SLID prior to year 2002.

Table 9 Wage and earnings returns to adult education, college vs. university

	Hourly wage			Annual earnings	
	Estimate	T		Estimate	T
NOCERT	-0.041	-1.40		-0.144	-1.94*
CERT (non-university)	0.049	2.83**		0.038	1.28
CERT (university)	0.083	2.14**		0.074	1.25

* significant at 10%

** significant at 5%

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

As mentioned in Section 3, only about 10% of adult students who obtained a post-secondary certificate did so at the university level. Were earnings returns confined to this small group, or did those who earned non-university certificates also realize earnings gains? Table 9 shows that there are significant hourly wage returns to both non-university and university level certificates (5% and 8%, respectively). Although returns to a university level certificate are higher, the difference is not statistically significant (the t-value for testing the equality of the coefficients is 0.82).

5.4 Do returns to adult schooling vary by sex, age and initial level of education?

Having found evidence that adults who return to school and obtain a post-secondary certificate generally gain significant returns on their additional human capital investment, we now ask whether there are differences in the returns to adult schooling between men and women, young and old, low- and high-educated workers. Some groups such as old and low-educated workers are of particular policy concern. The results are shown in Table 10.

21. To save space, we only present the estimates of main interest. Full regression results of this and the following tables are available upon request.

Firstly, the results reinforce our observation that the returns to adult schooling for those who obtain no post-secondary certificate are not significantly different from zero, and can be negative for some groups of workers, at least in the short-term period we examined.

Most groups of men and some women who obtained a post-secondary certificate enjoyed sizable wage and earnings gains. Overall, the estimated wage and annual earnings returns to men who obtained a certificate were 8% and 7%, respectively. All groups of men who obtained a certificate—young and old, high- and low-educated—had a significantly higher growth in their hourly wages compared to their counterparts who did not participate in adult schooling; the returns ranged from 6% for men whose initial level of education was college or higher to 10% for men with high school or less education. In addition, most groups of men (with the exception of those aged 35 to 59) received substantial returns to their annual earnings, though the results for high- and low-educated men were only significant at the 10% level.

Compared to men, where all groups benefited in some way from obtaining a certificate, benefits to women seem relatively limited. Only women aged 17 to 34 enjoyed high returns in both hourly wage and annual earnings—11% and 15%, respectively—upon obtaining a post-secondary certificate. In addition, low-educated women who obtained a post-secondary certificate received significant returns in hourly wage, but not in annual earnings. A reasonable explanation for this is that perhaps obtaining a post-secondary certificate allows previously low-educated women to reduce their hours worked at several different jobs, and focus on one better-paying job or one that may lead to a meaningful career.

5.5 *Returns to adult schooling for those who kept the same job, and those who switched jobs*

Those who gain from going back to school and obtaining a post-secondary certificate might conceivably do so in two different ways: they might progress within their firm's internal labour market by getting a promotion or a raise, or alternatively they might get a better-paying job with another employer. We investigate these possible scenarios by running separate models on two different sub-samples: (1) job-stayers, who kept the same main job, i.e., whose main employer was the same, all six years,[22] and (2) job-switchers, whose main job changed at least once in the six-year period. The results are presented in Tables 11 and 12.

22. Only job-stayers who were never laid off are included in the sub-sample. One hundred and four job-stayers whose employment in their main job was interrupted by a period of layoff, or whose layoff history was uncertain, were omitted from the analysis.

Table 10 Wage and earnings returns to adult education for different groups

	Men				Women			
	Hourly wage		Annual earnings		Hourly wage		Annual earnings	
	Estimate	T	Estimate	T	Estimate	T	Estimate	T
Pooled								
NOCERT	-0.025	-0.82	-0.104	-1.70*	-0.062	-1.29	-0.186	-1.47
CERT	0.077	3.61**	0.068	2.49**	0.035	1.40	0.033	0.60
17-34								
NOCERT	0.008	0.19	0.011	0.22	0.009	0.21	0.058	0.63
CERT	0.069	2.34**	0.089	2.25**	0.106	3.21**	0.147	1.87*
35-59								
NOCERT	-0.070	-1.76*	-0.272	-2.27**	-0.123	-1.50	-0.402	-2.11**
CERT	0.076	2.66**	0.045	1.35	-0.030	-0.86	-0.070	-1.00
High school or less								
NOCERT	-0.036	-0.94	-0.176	-1.20	-0.135	-1.24	-0.092	-0.59
CERT	0.101	2.06**	0.089	1.81*	0.097	2.17**	-0.041	-0.32
College or more								
NOCERT	-0.023	-0.54	-0.062	-1.11	-0.035	-0.77	-0.206	-1.42
CERT	0.058	2.79**	0.060	1.95*	0.007	0.25	0.066	1.22

* significant at 10%

** significant at 5%

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Table 11 shows that, overall, both men and women who obtained a post-secondary certificate while keeping the same main job reaped significant wage and earnings returns—10% and 9% respectively for men, and 6% and 9% respectively for women. Returns were substantial for job-staying men of all ages and education levels, while for women the gains were confined to two groups—women aged 35 to 59 and women whose initial level of education was college or higher. Women aged 35 to 59 received substantial returns in both their hourly wages and annual earnings, though only the latter was significant at the 5% level.

High-educated women who obtain a post-secondary certificate while staying on the same job register a significant gain in their annual earnings but not in their hourly wage rate. This implies that gains for this group of women result mainly from an increase in hours worked rather than an increase in wage rate.

Table 11 Wage and earnings returns to adult education for different groups of job-stayers

	Men				Women			
	Hourly wage		Annual earnings		Hourly wage		Annual earnings	
	Estimate	T	Estimate	T	Estimate	T	Estimate	T
Pooled								
NOCERT	-0.0002	-0.006	-0.035	-0.85	-0.075	-0.80	-0.112	-0.99
CERT	0.099	3.40**	0.094	3.62**	0.059	1.98**	0.087	2.12**
17-34								
NOCERT	0.003	0.05	0.001	0.01	0.014	0.23	0.027	0.35
CERT	0.063	1.65*	0.094	1.85*	0.029	0.61	0.060	0.75
35-59								
NOCERT	0.011	0.33	-0.055	-1.01	-0.109	-0.87	-0.167	-1.14
CERT	0.133	3.23**	0.086	3.51**	0.073	1.88*	0.095	1.99**
High school or less								
NOCERT	0.017	0.29	0.014	0.20	-0.324	-1.07	-0.401	-1.43
CERT	0.153	1.92*	0.127	1.91*	0.098	1.42	0.078	0.74
College or more								
NOCERT	-0.008	-0.23	-0.051	-1.00	0.021	0.61	0.039	0.98
CERT	0.076	3.28**	0.084	3.55**	0.040	1.35	0.077	2.12**

* significant at 10%

** significant at 5%

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Table 12 shows that, among job-switchers, obtaining a post-secondary certificate only results in significant wage returns for young men and women.[23] In fact, older certificate-obtaining women who switched jobs register some wage loss compared to their counterparts who do not participate in adult schooling. Older job-switchers who go back to school without obtaining a certificate may also register substantial losses, in both hourly wage and annual earnings for men, and annual earnings for women, at least in the short-term.

In addition, low-educated women who switch jobs while obtaining a post-secondary certificate may receive a wage return, though the estimate is only significant at the 10% level.

23. The fact that annual earnings returns for job-switchers are not significant is not surprising, considering that many job-switchers typically experience spells of non-employment.

Table 12 Wage and earnings returns to adult education for different groups of job-switchers

	Men				Women			
	Hourly wage		Annual earnings		Hourly wage		Annual earnings	
	Estimate	T	Estimate	T	Estimate	T	Estimate	T
Pooled								
NOCERT	-0.033	-0.64	-0.149	-1.53	-0.063	-1.29	-0.201	-1.27
CERT	0.058	1.97**	0.043	1.01	0.034	0.93	0.028	0.30
17-34								
NOCERT	0.029	0.42	0.023	0.29	-0.010	-0.19	0.031	0.24
CERT	0.084	1.92*	0.085	1.47	0.150	3.18**	0.186	1.55
35-59								
NOCERT	-0.139	-1.82*	-0.500	-2.15**	-0.122	-1.34	-0.493	-1.87*
CERT	0.011	0.28	0.019	0.28	-0.114	-2.16**	-0.184	-1.50
High school or less								
NOCERT	-0.021	-0.37	-0.259	-1.18	-0.061	-0.98	0.064	0.42
CERT	0.049	0.96	0.062	0.90	0.109	1.67*	-0.102	-0.47
College or more								
NOCERT	-0.045	-0.60	-0.079	-0.82	-0.068	-0.98	-0.314	-1.53
CERT	0.037	1.04	0.024	0.47	0.002	0.05	0.099	1.02

* Significant at 10%

** Significant at 5%

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

The different results for workers who stayed with the same employer and workers who changed employer can be explained by the relative changes in their general and firm-specific human capitals. We know that obtaining a post-secondary certificate increases general human capital while switching employer often results in a decline in firm-specific human capital. We also know that young workers generally have little firm-specific human capital to lose when they switch employers while other workers, particularly older workers who switch employers would lose much more than young workers. Hence, even the wage and earnings returns of a post-secondary certificate are the same for all of them, the net gains for employer-switchers who have accumulated a lot of firm-specific human capital, for example, older women, can be zero or negative since their losses in firm-specific human capital outweigh their gains in general human capital.

6. *Summary and conclusions*

Adult schooling is a key ingredient of lifelong learning. Who participates in adult schooling? Does adult schooling benefits all participants or just some of them, and by how much? These are important issues for workers, employers and policy makers but little is known in Canada on these questions.

Drawing on a sample of adult workers aged between 17 and 59 from Statistics Canada's Survey of Labour and Income Dynamics, we examine the participation patterns and the earnings and wage impacts of adult schooling. Our results indicate that, for both men and women, the participation decision is strongly correlated with individual characteristics such as age, initial level of education and marital status. Young (17 to 34 years old) and single workers were more likely than older (35 to 59 years old), married and divorced workers to participate in adult education and to obtain a post-secondary certificate. Workers with less than high school education who appear to have the greatest need to increase their human capital investment were less likely to participate in adult education than workers with high school or higher education.

The study also suggests that there are some important differences between men and women in adult schooling participation. For men, employment characteristics such as wage rate, full-/part-time status and firm size all affect their adult schooling participation. Higher wage tended to decrease their participation probability, while working part-time or working for a large firm increased their participation in adult schooling. For women, the effects of employment characteristics were not evident. Instead, the presence of pre-school age children (less than 6 years old) and family income seemed to be important: young children tended to decrease their probability of obtaining a post-secondary certificate, while lower family income appeared to encourage them to participate in adult education.

Our regression analyses on the impact of adult schooling show that obtaining a post-secondary certificate leads to significant wage and earnings returns for several groups of men and women. Looking at the entire sample of men, it appears that all groups—young and old, high- and low-educated—receive significant hourly wage returns (ranging from 6% to 10%) from obtaining a post-secondary certificate. However, upon examining sub-samples of job-stayers and switchers, it is clear that these returns are confined almost entirely to men who stay with the same employer. Among job-switchers, only 17- to 34-year-old men benefit from a post-secondary certificate. In terms of annual earnings, all groups of men who stay with the same employer benefit from obtaining a post-secondary certificate, but none of their job-switching counterparts do.

For women, a more complex story emerges. Among women who obtained a post-secondary certificate while staying with the same employer, only the older (35 to 59 years old) and those whose initial level of education was college or higher received significant earnings returns (10% and 8%, respectively). Older women also received substantial hourly wage returns. Among women who obtained their certificate while switching jobs, on the other hand, only 17- to 34-year-olds and women whose initial level of education was high school or less received wage returns.

One interesting extension of the current work is to look at adult schooling over the life cycle of individual workers: how adult schooling affects lifetime earnings and whether "adult-learning begets more adult-learning". These questions may be addressed in the future in a simulation framework such as the Statistics Canada's LifePaths Microsimulation model.

Appendix 1 Total earnings from all paid jobs

Various earnings concepts, such as hourly wage rate and annual earnings are employed by researchers in studying the returns to education. In SLID, there are two annual earnings concepts: i) total earnings from all paid jobs during a year, derived from the labour interview in which respondents are asked for detailed information on all jobs, and ii) total wages and salaries, obtained from the income interview in which respondents are asked to either report their annual wages and salaries from all jobs, or grant permission to Statistics Canada to access this information from their income tax records. Between the two annual earnings concepts, it turns out that the former is more accurate over all comparison periods, while the latter is not accurate for men between 1993 and 1998.

The comparison is based on the Longitudinal Worker File (1983 to 2000). The LWF is created by the Business and Labour Market Analysis (BLMA) Division of Statistics Canada. It is a 10% random sample of all Canadian workers, constructed by integrating data from the Record of Employment (ROE) files from Human Resources Development Canada, the T1 and T4 files from Canada Revenue Agency (formerly known as Canada Customs and Revenue Agency), and the Longitudinal Employment Analysis Program (a longitudinal file of Canadian business at the company level) of BLMA. Since earnings from the LWF are directly drawn from administrative sources, they are believed to be accurate.

From the LWF, we select workers aged between 17 and 59 years in 1993 to establish a panel corresponding to our 1993–1998 SLID panel. Since the LWF is available up to the year 2000, we select workers aged 17 to 59 in 1996 from the SLID and from the LWF to establish the 1996–2000 SLID and LWF panels. Workers from the first panel of LWF must have positive earnings in 1993 and 1998 and workers from the second panel of LWF must have positive earnings in 1996 and 2000. The percentage changes in average annual earnings are the following.

	1993–1998		1996–2000
LWF			
Men	20.98		20.91
Women	17.98		21.78
SLID: Earnings from all paid jobs			
Men	19.80		22.74
Women	19.77		22.82
SLID: Total wage and salary			
Men	26.38		20.74
Women	19.37		23.09

The 26% increase in total wage and salary for men in SLID 1993–1998 is not consistent with LWF, hence we choose total earnings from all paid jobs as our measure of annual earnings.

Appendix 2 A more flexible model on the earnings impact of adult schooling

Our results on the returns to adult schooling are based on a model where earnings and wages are assumed to grow according to a common path between those who participated and those who did not participate in adult schooling. In addition, our estimates are based on year-6 earnings and wages. For a worker who participated in year 2, the returns to adult education would be measured four years after the participation; while for a worker who studied in year 5, the returns would be measured one year after the study. Therefore, our estimated returns to adult education vary from 1- to 4-year returns.[24]

To address these problems, we propose a model similar to Jacobson et al. (1993) in which unobserved individual heterogeneity and time effect are directly modelled and each worker is allowed to have his/her own earnings growth path,

$$y_{it} = \alpha_i + \omega_i t + \theta_t + \sum_{k=-1}^{1} \delta_{-k} D_{it}^{-k} + \beta \mathbf{X}_{it} + \varepsilon_{it}$$

where y_{it} is the annual earnings (or hourly wage rate) of worker i at time t;[25] α_i represents the unobserved individual heterogeneity, $\omega_i t$ allows different workers to have different earnings growth paths, and θ_t captures general labour market condition at time t; $\boldsymbol{X}_{it}$ contains the same variables as in the regression model of Section 5. D_{it}^{-k} is vector of dummy variables that equals 1 if worker i participated in adult schooling at time t-k.[26]

In this model, δ_{-1} represents the earnings/wage change in the year before adult schooling. δ_0 measures the earnings change during the year of participation. When it is positive, this coefficient can be interpreted as the immediate returns to adult schooling.[27] δ_1 captures the earnings change one year after adult schooling.

The model was estimated separately for men and women, young and older workers (17 to 34 years old and 35 to 59 years old respectively), and low- and high-educated workers.[28] The results (Tables

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24. In our sample, the average length from the year of adult schooling participation (or the year when a post-secondary certificate was received) to year 6 is 2.4 years.

25. Since some workers may participate in adult schooling full-year full-time and hence receive no earnings, we do not take logarithm of the annual earnings or hourly wage rate in this model.

26. Given that the panel length of our data is only six years, and we only allow workers who attended school between years 2 and 5, we are able to estimate the earnings changes for the years before, during, and the year after adult schooling, hence k=-1, 0, 1.

27. Some participants can finish their program and find jobs within the year of participation. This is particularly applicable to hourly wage as participants may immediately receive higher wages upon completing their adult education.

28. To ensure the robustness of our estimate, as in the estimation of the regression model in Section 5, we employ 1,000 sets of bootstrap weights to calculate the standard errors of the estimates.

A4 and A5) show that young women gain significantly in hourly wage upon receiving a post-secondary certificate. The estimated wage change was $1.02 in the year immediately after a certificate was obtained. If we compare the wage gain with their first year average wage ($12.50), this translates into an 8% wage return. Similar wage returns are also observed for low-educated men, but the estimate was not significant. In terms of annual earnings, all men appeared to receive some gains (between $300 and $600) if they obtained a post-secondary certificate. But again, these earnings returns were not statistically significant.

Notice the estimated returns to adult schooling in this appendix are short-term in nature. They are either the immediate (current year) returns to adult schooling or the returns one year after adult schooling. While the estimated returns have a precise time dimension, given the relatively short panel, we may not be able to identify the true returns of adult schooling if it takes a few years for the earnings impact of adult schooling to materialize.

Table A1 Descriptive statistics

	Men		Women	
	mean	std err.	mean	std. err.
Age				
Young worker (17-34 yrs. old)	0.42	0.006	0.36	0.007
Marital status				
Married	0.73	0.006	0.70	0.007
Divorced	0.06	0.003	0.11	0.005
Single (never married)	0.21	0.005	0.19	0.006
Presence of kids < 6 yrs. old	0.24	0.005	0.19	0.006
Initial level of education				
Less than high school	0.20	0.005	0.15	0.005
High school graduate	0.21	0.005	0.23	0.006
Some college[1]	0.45	0.006	0.48	0.007
Bachelor or above	0.15	0.005	0.14	0.005
Hourly wage[2] in year 1	19.20	0.110	15.70	0.107
Hourly wage in year 6	21.80	0.125	17.16	0.118
Annual earnings in year 1	38,363	255.9	27,784	236.1
Annual earnings in year 6	44,659	288.2	31,602	268.9
After-tax family income in year 1	54,878	317.3	54,390	379.6
Adult schooling				
No additional schooling	0.86	0.004	0.85	0.005
No post-secondary certificate	0.05	0.003	0.07	0.004
Post-secondary certificate	0.08	0.004	0.08	0.004
Full-time job	0.98	0.002	0.89	0.005
Part-time job	0.02	0.002	0.11	0.005
Union member	0.43	0.006	0.36	0.007
Firm size (number of workers)[3]				
1 – 19	0.19	0.005	0.22	0.006
20 – 99	0.17	0.005	0.17	0.005
100 – 499	0.14	0.004	0.15	0.005
500 or more	0.46	0.006	0.43	0.007
Province				
Newfoundland	0.02	0.002	0.02	0.002
PEI	0.01	0.001	0.01	0.001
NS	0.04	0.002	0.04	0.003
NB	0.03	0.002	0.03	0.003
Quebec	0.28	0.006	0.28	0.007
Ontario	0.35	0.006	0.35	0.007
Manitoba	0.04	0.002	0.03	0.003
Saskatchewan	0.03	0.002	0.03	0.004
Alberta	0.09	0.004	0.09	0.005
BC	0.12	0.004	0.11	0.004
Area population				
Rural area	0.11	0.004	0.10	0.004
urban: <= 29,999	0.15	0.005	0.14	0.005
urban: 30,000 - 99,999	0.11	0.004	0.12	0.005
urban: 100,000 - 499,999	0.18	0.005	0.18	0.006
urban: 500,000+	0.46	0.006	0.46	0.007

Table A1 Descriptive statistics (concluded)

	Men		Women	
	mean	std err.	mean	std. err.
Occupation				
Management	0.11	0.004	0.07	0.004
Administration	0.10	0.004	0.36	0.007
Science	0.08	0.004	0.02	0.002
Health	0.01	0.001	0.09	0.004
Social science	0.04	0.003	0.09	0.004
Art, culture and sports	0.01	0.001	0.02	0.002
Sales and services	0.16	0.005	0.23	0.006
Trades and transportation	0.28	0.006	0.02	0.002
Unique in primary industries	0.04	0.002	0.01	0.001
Unique in manufacturing	0.14	0.004	0.07	0.004
Industry				
Agriculture	0.01	0.002	0.01	0.001
Primary industry	0.04	0.002	0.01	0.001
Utility	0.02	0.002	0.01	0.001
Construction	0.08	0.004	0.01	0.002
Manufacture	0.25	0.006	0.11	0.005
Trades	0.14	0.004	0.14	0.005
Transportation and warehouse	0.07	0.003	0.03	0.002
Finance and insurance	0.03	0.002	0.08	0.004
Professional services	0.03	0.002	0.05	0.003
Managing	0.02	0.002	0.02	0.002
Educational services	0.05	0.003	0.17	0.004
Health care	0.03	0.002	0.04	0.006
Information	0.04	0.002	0.04	0.003
Accommodation	0.03	0.002	0.06	0.004
Other services	0.04	0.002	0.03	0.003
Public administration	0.09	0.004	0.09	0.004
Panel 1996-2001	0.51	0.006	0.52	0.007
Female	0.00	0.000	0.42	0.005
No. of observations	6,257		4,742	

1. This includes all workers whose initial level of education is above high school and below the bachelor level
2. Wage, earnings and family income are converted in 2001 constant dollars
3. There are 4% men and 3% women for whom the employer size is unknown

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Table A2 Marginal effect: logit and multinomial logit estimates*

Variable	Logit		Multinomial logit			
			no certificate		Post-secondary certificate	
1. Men	dpr/dx	z-value	dpr/dx	z-value	dpr/dx	z-value
Hourly wage	-0.0012	-1.23	-0.0009	-2.52	0.0002	0.30
17-34 yrs old	0.0655	4.38	0.0140	2.75	0.0406	3.47
< High school	-0.0405	-2.38	0.0051	0.59	-0.0469	-4.70
College	0.0272	1.61	0.0095	1.28	0.0107	0.93
University+	0.0092	0.35	0.0113	0.81	-0.0077	-0.44
Divorced	-0.0142	-0.58	-0.0119	-1.53	0.0046	0.23
Single	0.0335	1.74	0.0119	1.56	0.0114	0.83
Young kid<6	0.0134	0.87	-0.0032	-0.60	0.0168	1.39
High-ed. parents[1]	0.0228	1.41	0.0111	1.55	0.0047	0.42
Income: 1st quartile[2]	-0.0091	-0.50	-0.0038	-0.59	-0.0027	-0.20
2nd quartile	-0.0112	-0.65	-0.0041	-0.62	-0.0039	-0.30
3rd quartile	-0.0102	-0.60	-0.0026	-0.39	-0.0048	-0.38
Large city[3]	0.0138	1.20	0.0068	1.47	0.0024	0.29
Part-time job	0.1506	2.45	0.0514	1.75	0.0509	1.17
Firm size: 20-99[4]	0.0115	0.56	0.0078	0.83	0.0004	0.03
Firm size: 100-499[4]	0.0174	0.74	0.0236	1.80	-0.0138	-0.99
Firm size: 500+[4]	0.0267	1.44	0.0181	2.21	-0.0011	-0.08
Union member	-0.0065	-0.44	0.0001	0.02	-0.0070	-0.62
2. Women						
Hourly wage	-0.0018	-1.00	-0.0005	-0.68	-0.0009	-0.74
17-34 yrs old	0.0495	2.25	0.0142	1.31	0.0269	2.29
< High school	-0.0278	-1.30	0.0092	0.77	-0.0370	-2.93
College	0.0361	1.71	0.0131	1.22	0.0162	1.30
University+	0.0409	1.18	0.0244	1.27	0.0036	0.18
Divorced	-0.0092	-0.41	0.0183	1.34	-0.0312	-2.79
Single	0.0708	2.54	0.0362	2.50	0.0164	1.05
Young kid<6	-0.0314	-1.76	-0.0042	-0.50	-0.0230	-2.15
High-ed. parents[1]	-0.0003	-0.02	0.0015	0.18	-0.0026	-0.23
Income: 1st quartile[2]	0.0569	1.99	0.0170	1.30	0.0259	1.49
2nd quartile	0.0040	0.19	-0.0011	-0.12	0.0044	0.30
3rd quartile	0.0095	0.48	-0.0033	-0.38	0.0126	0.88
Large city[3]	-0.0130	-0.95	0.0010	0.17	-0.0133	-1.42
Part-job	0.0322	1.37	0.0159	1.34	0.0079	0.56
Firm size: 20-99[4]	0.0129	0.43	0.0162	0.99	-0.0126	-0.95
Firm size: 100-499[4]	0.0003	0.01	0.0009	0.09	-0.0010	-0.06
Firm size: 500+[4]	-0.0201	-1.03	-0.0039	-0.43	-0.0133	-1.08
Union member	-0.0225	-1.33	-0.0038	-0.50	-0.0151	-1.35

* 16 industry and 10 occupation and provincial dummies are controlled

1. High-educated parents =1 if one or both parents received college or higher education
2. After-tax family income
3. Large city equals 1 if area population is 100,000 or higher
4. Firm size is measured by the number of employees who worked in the firm

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 and 1996 to 2001.

Table A3 Returns to adult education: alternative model*

Men	Wage		Earnings	
	1	2	1	2
Overall				
δ_{-1}	-0.55	0.16	-532	-3,323
	(-1.07)	(0.31)	(-0.42)	(-2.20)
δ_0	-0.99	0.46	-1,830	-2,061
	(-1.95)	(0.86)	(-1.32)	(-1.01)
δ_1	-0.43	-0.41	-171	558
	(-1.14)	(-0.88)	(-0.16)	(0.59)
Young workers (17 - 34)				
δ_{-1}	-0.64	-0.14	-69	-3,112
	(-1.12)	(-0.25)	(-0.05)	(-2.23)
δ_0	-0.72	0.29	-2,314	-3,048
	(-1.24)	(0.40)	(-1.42)	(-0.95)
δ_1	-0.06	-0.6	-383	640
	(-0.13)	(-0.86)	(-0.32)	(0.48)
Older worker (35 - 59)				
δ_{-1}	-0.43	0.49	-356	-3,320
	(-0.45)	(0.53)	(-0.17)	(-1.27)
δ_0	-0.94	0.65	-50	-904
	(-1.00)	(0.83)	(-0.02)	(-0.48)
δ_1	-1.01	-0.09	949	560
	(-1.29)	(-0.16)	(0.47)	(0.42)
Low-educated workers				
δ_{-1}	-0.33	0.76	-3,379	-2,584
	(-0.69)	(0.88)	(-1.78)	(-1.52)
δ_0	-1.58	1.27	-7,776	-2,204
	(-2.86)	(1.48)	(-3.94)	(-1.27)
δ_1	-0.43	0.52	-4,688	309
	(-0.88)	(0.65)	(-2.82)	(0.15)
High-educated workers				
δ_{-1}	-0.67	-0.12	524	-3,239
	(-0.96)	(-0.18)	(0.34)	(-1.69)
δ_0	-0.78	0.03	633	-2,014
	(-1.14)	(0.05)	(0.37)	(-0.75)
δ_1	-0.36	-0.8	1,692	510
	(-0.73)	(-1.44)	(1.26)	(0.45)

Table A3 Returns to adult education: alternative model (concluded)

Women	Wage		Earnings	
	1	2	1	2
Overall				
δ_{-1}	0.46	0.45	-927	-1,159
	(0.98)	(1.31)	(-1.12)	(-1.42)
δ_0	0.33	0.19	-1,895	-2,001
	(0.66)	(0.49)	(-1.68)	(-1.93)
δ_1	0.50	0.29	-1,557	-1,176
	(0.97)	(0.77)	(-1.24)	(-1.19)
Young workers (17 - 34)				
δ_{-1}	0.65	0.44	-536	-1,657
	(0.97)	(0.99)	(-0.48)	(-1.57)
δ_0	0.75	0.95	-417	-2,263
	(1.46)	(1.59)	(-0.28)	(-1.43)
δ_1	0.46	1.02	72	-835
	(0.72)	(1.66)	(0.04)	(-0.55)
Older worker (35 - 59)				
δ_{-1}	0.26	0.67	-1,265	-893
	(0.44)	(1.21)	(-1.13)	(-0.72)
δ_0	-0.03	-0.44	-3,188	-1,696
	(-0.03)	(-0.71)	(-1.75)	(-1.29)
δ_1	0.56	-0.25	-3,023	-1,564
	(0.77)	(-0.49)	(-1.75)	(-1.20)
Low-educated workers				
δ_{-1}	-0.26	0.37	-905	676
	(-0.21)	(0.77)	(-0.89)	(0.52)
δ_0	-1.10	-0.10	-4,403	-1,923
	(-0.75)	(-0.15)	(-2.43)	(-1.10)
δ_1	-0.04	-0.36	-329	-1,291
	(-0.07)	(-0.60)	(-0.30)	(-0.72)
High-educated workers				
δ_{-1}	0.75	0.39	-748	-1,943
	(1.73)	(0.88)	(-0.74)	(-1.86)
δ_0	0.83	0.23	-710	-1,972
	(1.79)	(0.46)	(-0.52)	(-1.56)
δ_1	0.69	0.45	-1,888	-1,139
	(1.02)	(0.89)	(-1.12)	(-0.97)

* δ_{-1}, δ_0, δ_1: wage/earning changes in the year before, during and after adult schooling.

1 indicates adult schooling participation but no post-secondary certificate was obtained, while

2 indicates that a post-secondary certificate was obtained. The t-values (in parenthesis) were calculated with 1,000 sets of bootstrap weights.

Source: Survey of Labour and Income Dynamics (SLID), 1993 to 1998 (panel 1) and 1996 to 2001 (panel 2).

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